Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

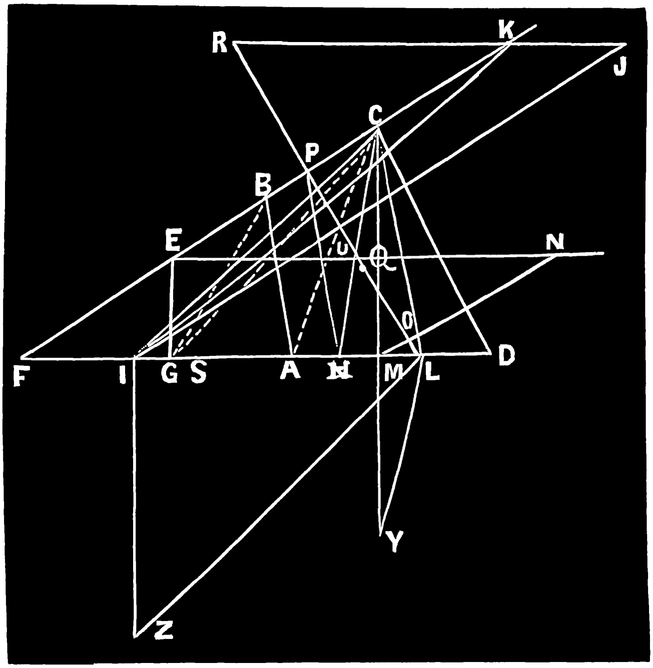
We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

FD meeting FC in K. Join KG and draw CI parallel to KG, join KI. Then $ICG=ICK$ and $FCI=FCI$.

$\therefore FCG=FKI$. Draw IJ parallel to FC, then parallelogram $FKJI=FCH$. At the point I draw IZ perpendicular to FD and equal to RK, draw $ZL=RJ$. Then $RPUL$ is the line required; for $LZ^2-IZ^2=IL^2$ or $VRJ-PRK=IVL=PVJK$.



$\therefore FPL=FKJI=FCH$. Now $SBA=SBC$. $\therefore FBA=FCS$ or $FPL-FBA=FCH-FCS$.

$\therefore ABPL=SCH=\frac{1}{2}ABCD$.

(3). Let Q be the point within the quadrilateral. Draw QE parallel to FD meeting FC in E. Join EG and draw CM parallel to EG, join EM. Then $EGM=EGC$ and $FEM=FCG$. Draw MN parallel to FC; then $FENM=FCH$. At the point M draw MY perpendicular to FD and equal to EQ, draw $YL=QN$. Then $PQOL$ is tne required line, for $LY^2=MY^2+ML^2$ or $QON=PEQ+MOL$.

$\therefore FPL=FENM=FCH$. $\therefore FPL-FBA=FCH-FCS=SCH$.

$\therefore ABPL=SCH=\frac{1}{2}ABCD$.

Also solved by G. W. Greenwood, B. A. (Oxon).

220. Proposed by G. B.M. ZERR, A. M., Ph. D., Parsons, West Va.

Two triangles are circumscribed to a given triangle ABC, having their sides perpendicular to the sides of the given triangle. Prove that the two triangles are equal, and find the area of these triangles.

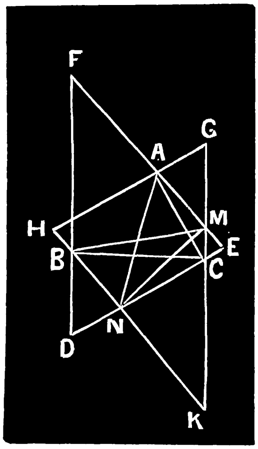
I. Solution by G. W. GREENWOOD, B. A. (Oxon), Professor of Mathematics and Astronomy, McKendree College, Lebanon, Ill.

The perpendiculars to a side of the given triangle at its extremities, which are corresponding sides of the circumscribed triangles, are symmetrical with respect to any point on the perpendicular bisector of that side. Hence the two triangles are symmetric with respect to the circumcenter of the given triangle and are therefore equal. The area of either is equal to

$$\tfrac{1}{2}(c^2\cot B+a^2\cot C+b^2\cot A)+S,$$

where S is the area of the given triangle.

II. Solution by PROPOSER.



Let ABC be the given triangle area $\triangle$; DEF, GHK the circumscribed triangles; FE, GK intersecting in M; DC, HK intersecting in N. Join BM, AN, MN. The triangles DEF, GHK are equiangular. $\angle BAM=\angle BCM=\angle ACN=\angle ABN=$ a right angle.

$\therefore$ A circle passes through A, M, C, B and A, C, N, B, respectively.

$\therefore \angle AMB=\angle ACB=\angle ANB$.

$\therefore AM=BN$ and is parallel to it, $MN=AB$ and is parallel to it.

$\therefore AF=NK$, $ME=HB$, $\therefore FE=HK$ and $DEF=GHK$. Let $A=$area of DEF, then $2A=EC.AC+FA.AB+DB.BC+\triangle=b^2\cot A+c^2\cot B+a^2\cot C+\triangle=c^2\cot A+a^2\cot B+b^2\cot C+\triangle$.

$\therefore 4A=[a^4+b^4+c^4-bc(b^2+c^2)-ac(c^2+a^2)-ab(a^2+b^2)+4\triangle^2]/2\triangle$.

Also solved by F. D. Posey, San Mateo, California; L. E. Newcomb, Los Gatos, California; and J. Scheffer, Hagerstown, Md.

MECHANICS.

165. Proposed by O. W. ANTHONY, DeWitt Clinton High School, New York City.

Find the approximate form of a tower of circular cross section 1000 feet high and having a radius of lower base 20 feet, and so constructed that all the parts of the structure shall be subject to the same stress, due to the weight of the part of the tower above.

III. Solution by CHRISTIAN HORNUNG, A. M., Professor of Mathematics, Heidelberg University, Tiffin, O.

Let $w=$the weight per unit of volume; $s=$the stress (pressure per square inch); $y=$the radius of cross section at distance x from top.

Then $\pi y^2=$the area of cross section at distance x from top, and, by the conditions of the problem, the increment of the area for any increment of x multiplied by s, must equal the increment of the weight, we get, in the limit, $\frac{dy}{dx}=\frac{w}{2s}y$. Integrating, we find $y=ce^{(w/2s)x}$. Now since $y=20$ when $y=1000$, $c=20e^{-(1000w/2s)}$.

$\therefore y=20e^{(w/2s)(x-1000)}$, which, by assigning proper values to w and s, will give the form of an element of the lateral surface of the tower. If we call $w=\frac{1}{10}$ and $s=20$, the radii of the tower at different elevations would be as follows: At 100 feet, 12.13 feet; at 200, 7.36; at 300, 4.46; at 400, 2.70; at 500, 1.64; at 600, .996; at 700, .604; ot 900, .222; at 990, .1417; and at top, .1348 feet or 1.6 inch.

This result will fulfill the required condition as to stress everywhere except near the top.

166. Proposed by G. B. M. ZERR, A. M., Ph D., Parsons, W. Va.

If a gravitating particle of mass m be placed at the point (a, b, c) prove